DOCUMENT RESUME

ED 126 021 SP 010 215

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TITLE A Technique to Provide Lecturers with Continuous Student Feedback.
PUB DATE 75
NOTE 15p.; Paper presented at the annual meeting of the American Psychological Association (83rd, Chicago, Illinois, August 30 - September 3, 1975) ; Not available in hard copy due to marginal reproducibility of original document

EDRS PRICE MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS *Behavior Change; Behavior Theories; Comprehension; *Conditioning; *Feedback; *Lecture; *Student Evaluation of Teacher Performance; Teacher Behavior; Teacher Improvement

ABSTRACT

In an attempt to shape better teaching, 18 students were given the opportunity to provide continuous feedback to a college instructor concerning a particular aspect of his lecturing. A student feedback device (SFD) used in this research consists of three major parts: (1) a feedback panel containing 18 indicator lights, each light being clearly visible by the lecturer; (2) 18 silent, push-button switches, each spring-return button being connected to a separate indicator light that illuminates whenever the button is pushed and remains illuminated as long as the button is held down with slight pressure; and (3) 18 ink pens that draw continuous lines on recording paper unrolling at a specific speed and controlled by a particular feedback button. In one experiment, feedback occurred whenever the students in an advanced psychology class and a graduate statistics class did not understand the lecture material. A second application of the SFD in these classes required eight students to depress their buttons as long as the lecture was too slow; while eight other students responded when the lecture was too fast. Both undergraduate and graduate students showed resistance and difficulty in making appropriate on-the-spot judgments of understanding and indicated a very high tolerance for slow, boring lecturing, but a low tolerance for a fast lecture pace. Thus, the research showed how continuous feedback can be presented to lecturers, but clearly illustrated a need for procedural refinements to make such feedback appropriate. (Author/MM)

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A Technique to Provide Lecturers with Continuous Student-Feedback[1]

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Learning principles developed in the animal laboratory of the experimental psychologist are now widely used to change human behaviors. The methodology has been termed behavior modification and essentially involves manipulating appropriate environmental contingencies so that desirable behaviors are followed immediately by pleasant consequences and undesirable behaviors are followed by unpleasant consequences. Initially the efficacy of behavior modification was demonstrated on individuals in mental institutions, but today the techniques are being used for effective behavior management in such diverse social settings as prisons, schools, hospitals, summer camps, supermarkets, and the armed forces. In some situations the application of basic learning principles for behavior management has necessitated the development of inventive apparatus. For example, behavior engineers have designed mechanical devices to present programmed learning material, to improve postural control, to eliminate a smoking habit, and to automatically desensitize a phobia. The purpose of the present research was to design an effective behavior modification technique for improving lecture behaviors. The success of such a project would have provocative implications for training teachers, lawyers, politicians,

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entertainers, salesmen, and anyone else who must communicate orally with an audience.

To improve posture, Azrin, et al. (1968) developed an apparatus that, when strapped to an individual's back, would emit an audible tone as soon as improper posture occurred. The authors found this immediate feedback device to be extremely effective in developing appropriate posture behaviors. To train appropriate lecture behaviors we developed an analogous technique to present immediate feedback to the college lecturer. More specifically, the students in college classrooms indicated continuous judgments of a given lecture quality by maintaining a switch in one of two positions. The judgments were indicated on a light panel that was displayed to each lecturer during his presentation. This first report of our efforts presents attempts to use this feedback procedure to increase the probability of student understanding and to maintain an optimal lecture pace. This initial research can only be considered as pilot work, but the methodology is provocative and the findings provide important implications for future refinements and applications of the technique.

Method

Apparatus

The student feedback device (SFD) consists of three major parts: (1) a feedback panel containing 18 indicator lights, mounted on a black, plywood board, each light being clearly visible by the instructor when the panel is placed at the back of a 60-student classroom; (2) 18 silent, push-button switches which can be quickly distributed to

students seated in a standard classroom arrangement, each spring-return button being connected to a separate indicator light that illuminates whenever the button is pushed and remains illuminated as long as the button is held down with slight pressure; and (3) 18 ink pens that draw continuous lines on recording paper unrolling at a specified speed, each pen being controlled by a particular feedback button and moved to the left as long as its button is pushed. One additional pen moves to the left whenever the feedback lights are working (i.e., during the Feedback condition) and remains in its normal position whenever the feedback lights are not working (i.e., during the No-Feedback condition).

General Procedure

The college students in two classes were requested to provide certain information on a 3 x 5 inch card, including a list of lecture behaviors they would like to judge and/or see changed and an indication as to whether or not they would like to be one of the anonymous judges for the feedback experiment. Unassisted by the classroom instructor, two research assistants selected 18 student-judges from the volunteers. Before the start of each class period the SFD panel, judgment buttons, and pen recorder were positioned in the classroom, and the student-judges took assigned seats where their personalized judgment buttons were located. The feedback light panel was situated so that it could be readily observed by the instructor and not seen by the students without turning their heads. At the beginning of each lecture the instructor reminded the class of the lecture dimension

being judged, requested that the students not look at the feedback panel, and prompted the judges to press their button as soon as the specified, undesirable aspect of the particular dimension occurred and to keep their button depressed until the undesirable lecture quality ceased.

Throughout the lectures a graduate research assistant monitored the SFD, making the panel lights either capable or incapable of being illuminated (i.e., Feedback vs. No Feedback conditions) according to a pre-arranged schedule that varied between lectures. Determined randomly, each condition lasted for 5, 10, or 15 min., and only the graduate research assistant was aware of the schedule for a particular class. Depending upon the experimental design and the research questions, the following in-class observations were recorded by a pair of research assistants: (1) the number of instructor eye contacts with the feedback light panel, (2) the frequency of questions asked by instructor and students, and (3) obvious changes in the lecture pace.

The major data analysis consisted of comparing both the rate and length of time that each button was depressed between the Feedback and No-Feedback conditions of each daily lecture.

Results of Specific Applications

Judgments of Personal Understanding

For seven 50-min. lectures, 18 advanced undergraduates in a 40-student psychology class in Human Choice Behavior (taught by the senior author of this paper) were instructed to press their judgment button

whenever they did not completely understand the presentation and to keep their button depressed until the lecture became understandable. Also, for each of three consecutive 75-min. lectures this judgment task was given to 16 graduate students in a 20-student educational statistics class (taught by an instructor in education who was uninvolved in the design of the research project).

The analyses of group rate (i.e., total number of button pushes per minute) and of button-press duration (i.e., average proportion of button-depression duration by individuals who pressed their button at least once during a lecture) indicated extremely low operant levels for both classes. For the psychology class the overall group rate was 1.50 per min. and the average percentage of time that a judgment button was depressed was 4.5%. For the statistics class these calculations were 0.57 per min. and 1.5%, respectively. No consistent differences between the Feedback and No Feedback conditions were observed in either class.

Systematic observations during these class periods and written answers to questionnaires distributed at the end of all sessions during which understanding was judged indicated that the low operant levels for judgments of "not understand" were not necessarily due to lecture behaviors. That is, several judges (as many as ten in the statistics class) set their judgment button aside for the complete lecture; and most of the judges indicated that it was difficult to make on-the-spot evaluations of personal understanding. In fact, the students' written definitions of understanding commonly referred to "understand" as being

able to write the lecture material clearly in one's notebook so that a subsequent review (before an exam) would enable comprehension. Also, several students admitted that their cognitive involvement in the lecture completely inhibited their judgment behaviors.

Lecture Pace Judgments

Following all sessions of judging personal understanding, the students in each class were instructed that the judges would attempt to continuously judge the pace of ongoing lectures. The judges were prompted to inform one of the research assistants if they desired to discontinue their judgment task, and if deciding to continue their judgment task, to indicate which pace dimension they would rather judge ("too fast" or "too slow"). The feedback panel was divided in half, each half corresponding to a group of eight judges. One group was instructed to keep their button depressed as long as the lecture pace was "too fast" and the other group was told to keep their button depressed as long as the lecture was "too slow".

Once again the operant level of button pushing was so low that lecture modification via feedback lights was improbable. For the seven consecutive lecture days of the psychology class the overall group rates were 0.685 responses per min. for "too fast" and 0.42 responses per min. for "too slow", and the average proportions of time that a button was depressed were 0.03 and 0.04, respectively. The four lecture-days in the statistics class resulted in rates of 0.24 per min. for "too fast" and 0.27 per min. for "too slow", with respective duration proportions of 0.03 and 0.025.

Role Playing

The data obtained on the eighth day of the fast/slow judging in the psychology class suggested low validity in the student-judgments of the previous sessions. On this day the Feedback condition was in effect throughout the 50-min. lecture, and the graduate research assistant alternately gave two different signals to the instructor. One signal prompted the instructor to lecture at an obviously slow pace until at least five of the eight lights were illuminated in the "too slow" section of the feedback panel; another signal was used to set the occasion for fast lecturing which was to continue until at least five of the "too fast" lights were illuminated. Two research assistants independently recorded obvious changes in the lecture pace. The data from these recordings showed reliably that the instructor followed the pace signal appropriately in every case.

Surprisingly, the instructor could not get more than three students to simultaneously indicate a judgment of "too slow", but readily provoked simultaneous judgments of "too fast". In an attempt to prompt judgments of "too slow" the instructor (and senior author of this paper) not only lectured in an extremely slow, unenthusiastic, and boring style but actually emitted the following low-probability response patterns: (1) standing with arms folded and saying nothing for periods as long as 30 sec., (2) returning to the same exact point in the lecture on as many as six occasions, (3) standing at the lectern and paging through lecture notes for 30 sec., and (4) pacing back and forth in front of the class without saying a word.

The group rates and duration proportions of button pushing for the "too slow" prompt and the "too fast" prompt conditions are depicted in figure 1. The upper panels represent the eight students who responded when the lecture pace was too fast and show response rates and duration proportions appropriate to the condition. That is, these judges pushed their judgment button prominently more often and for longer durations when the lecture was fast rather than slow. In fact, the relatively short periods of fast lecturing occurred because the change criterion of five simultaneous feedback lights was quickly reached in each case. On the other hand, the slow-pace judgments never reached the feedback criterion required for a lecture change, and, in fact, judgments of "too slow" occurred more frequently during the fast rather than the slow lecture pace.

At the end of the class period the instructor asked all of the students to take out a sheet of paper and (without including their name, to write down any events of the class period that seemed different or unusual. The nature of the students' comments were unexpected, and rather discouraging. Only four of the 34 students mentioned any suspiciousness that the instructor was role playing or intentionally attempting to lecture at unusual paces. Only 50% of the students mentioned something about the lecture being slow, boring, or redundant; while 83% of the students indicated that the lecture was often too fast. Apparently the students had a much greater tolerance for boring than for speedy lecturing.

Discussion

Systematic applications of operant psychology to control student behaviors are becoming widespread. The present research represents an attempt to apply behavior modification technology on teachers rather than students.

Obviously the present research did not show that college lectures can be improved with the use of immediate and continuous student feedback, but perhaps the study can be considered an initial step in that direction. The fact that behaviors are changeable with appropriate feedback is a fact of behavioral psychology. The present research demonstrated how continuous feedback can be presented to lecturers, but clearly illustrated a need for procedural refinements to make the feedback appropriate. Thus, a subsequent challenge for research in this area is to train and motivate students to provide appropriate lecture feedback.

We are currently involved in follow-up research which might make the initial results presented herein more significant. In one project we are asking students to complete semantic differentials periodically throughout classroom lectures in order to determine the reliability of students' judgments about various lecture dimensions (e.g., instructor's enthusiasm, relevancy and organization of lecture material, understanding of lecture, and pace of lecture). In addition, we are continuing to use the Student Feedback Device (SFD), but with several procedural modifications. For example, the following techniques have been implemented to increase the probability that students will continually

and appropriately judge the pace of the senior author's lectures in a Behavior Modification course. (1) a 75-min. lecture was given concerning the shaping principles behind the SFD concept and the specific artifacts encountered during previous applications; (2) a 75-min. practice session occurred during which the judgment buttons were passed among interested students, and the instructor prompted judgments of a fast and slow pace and verbally reinforced the occurrences of appropriate feedback; (3) throughout each lecture the instructor intermittently prompts lecture judging; and (4) the student-judges who do not use their judgment button are replaced.

A third project currently in progress is studying the utility of the SFD for training student teachers. Specifically, with this application the instructor is the only "button pusher" and the student-teachers watch the panel during their individual classroom presentations in order to receive particular cues. For example, the occurrence of one light may prompt the speaker to give an explanatory illustration while another light may prompt the teacher to ask the class an appropriate question. Through special training sessions we are attempting to overcome an obvious problem of student-teachers avoiding observations of the feedback panel.

References

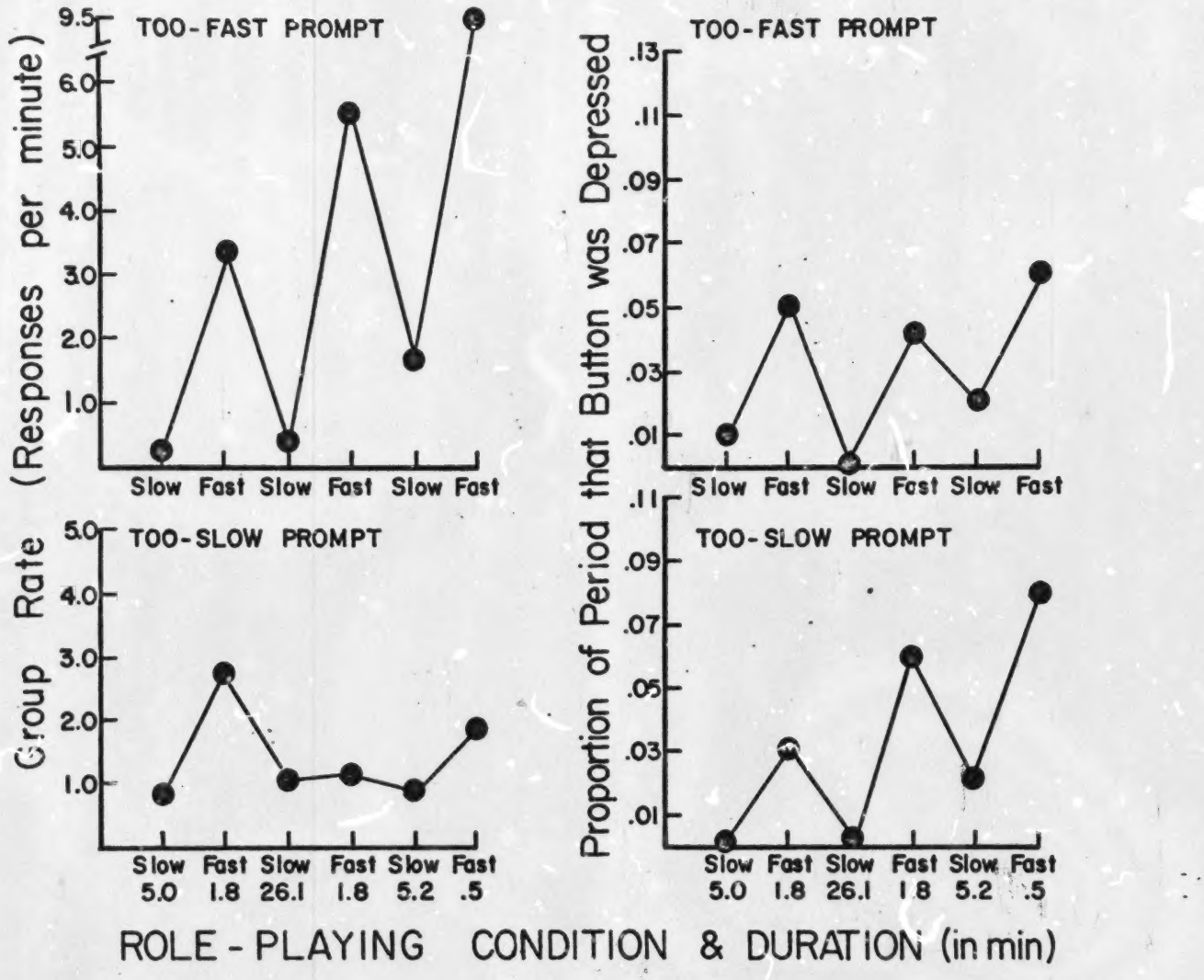
Azrin, N., Rubin, H., O'Brien, F., Ayllon, T., & Roll, D. Behavioral engineering: Postural control by a portable operant apparatus. Journal of Applied Behavioral Analysis, 1968, 1, 99-108.

Footnote

1. Materials to build the Student Feedback Device were purchased with funds provided by Grant 1891460 from the College of Arts and Sciences, Virginia Polytechnic Institute and State University (1972-73). The research with the Student Feedback Device was supported by a grant from the Teaching-Learning Committee, Office of Special Academic Programs, Virginia Polytechnic Institute and State University (1974-75). The authors are grateful for the helpful communications with Roberts A. Braden and Robert B. Frary of the Learning Resources Center, Virginia Polytechnic Institute and State University, and Jeffery A. Stewart of the College of Education, Virginia Polytechnic Institute and State University.

Figure Caption

Figure 1. The group-rate of button pushing and the average proportion of time during each period that a button was pressed for the eight students who pressed their button whenever the lecture was judged "too fast" (i.e., upper two graphs) and for the eight students who pushed their button as long as the lecture was judged "too slow" (i.e., lower two graphs).


TOO-FAST PROMPT
TOO-SLOW PROMPT
Group Rate (Responses per minute)
Proportion of Period that Button was Depressed
9.5
6.0
5.0
4.0
3.0
2.0
1.0
.13
.11
.09
.07
.05
.03
.01
Slow Fast Slow Fast Slow Fast
5.0 1.8 26.1 1.8 5.2 .5
ROLE - PLAYING CONDITION & DURATION (in min)